ENV H 543:
Quantitative Microbial Risk Assessment

Spring Quarter, 2014
Monday, Wednesday, and Friday, 12:30-1:20
HSL Computer Lab A

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OFFICE HOURS: By Appointment

COURSE DESCRIPTION:
This course will cover the processes involved in quantitative assessment of the risk posed from environmentally transmitted pathogens. The course material will be divided into discrete sections representing the basic steps of QMRA: hazard identification, exposure assessment, health effects assessment, risk characterization, and risk communication. This course will be of use for public health and health care professionals, microbiologists, civil and environmental engineers, environmental scientists and bio-defense specialists.

COURSE LEARNING OBJECTIVES:
By the end of this course, students will be able to:

1. List and describe the differences between microbial and chemical risk assessment.
2. Define the purpose and recognize the benefits and limitations of quantitative microbial risk assessment.
3. Identify and define microbial risks.
4. Identify and summarize the major routes of exposure for microbial threats.
5. Recognize and outline the basic frameworks for quantitative microbial risk assessment.
6. Identify microbial hazards and formulate specific problems for which to assess risk.
7. List and distinguish between the various health endpoints for a quantitative microbial risk assessment.
8. Summarize the major host, microbial, and environmental factors affecting exposure assessment.
9. Define and apply deterministic models for the assessment of microbial risk.
10. Compare and contrast deterministic and probabilistic approaches to assessment of microbial risk.
11. Apply probabilistic techniques to assess microbial exposures.
12. Summarize the major host, microbial, and environmental factors affecting dose response analysis.
13. Recognize and apply common curve fitting models to dose response data.
14. Integrate exposure and dose/response assessments to arrive at quantitative estimate of individual and population risks.
15. Define and discuss common metrics for the expression of microbial risk.

16. Evaluate sensitivity and uncertainty in microbial risk estimates.
17. Analyze and critique published microbial risk assessments
18. Recognize and define appropriate use of quantitative microbial risk assessment.
19. Identify and explain the factors involved in risk communication.

TEXTS AND REFERENCES:
The recommended text for this course is *Quantitative Microbial Risk Assessment* (Haas, Rose, and Gerba; John Wiley & Sons, Inc.). A new edition of the book is due in July so we are not asking students to purchase the book. I will have a copy available for students to borrow. Another text *Microbiological Risk Assessment in Food Processing* (Brown and Stringer; Woodhead Publishing) is available online at http://www.knovel.com/knovel2/Toc.jsp?BookID=683. Additional Readings and course materials will be available through the course webpage or handed out in class. The following texts are recommended supportive references for course topics:

Books-
Manual of Environmental Microbiology, 2nd edition, ASM Press
Disinfection, Sterilization and Preservation, 5th edition, LWW
Metcalf and Eddy's Wastewater Engineering: Treatment and Reuse, McGraw-Hill
Water Quality and Treatment, 5th edition, AWWA
Bioaerosols Handbook, Lewis
Food Microbiology, Doyle
Any Basic Microbiology Text (e.g. Madigan, Martinko and Parker; Prescott, Harley and Klein; etc.)

Journals-
Journal of Applied Microbiology
Letters in Applied Microbiology
Journal of Applied and Environmental Microbiology
Journal of American Water Works Association
Journal of Food Protection
International Journal of Food Microbiology
Water Science and Technology
Water Research
Emerging Infectious Disease

CLASS PARTICIPATION: Although class attendance is not expressly required, students will be expected to participate in classroom discussion and learning activities. Students will not have the opportunity to earn class participation credit for course periods during which they are absent.

COURSE FORMAT: Classes will include a mix of lecture-based format and hands on computer-based training.

GRADING OPPORTUNITIES:
For the sake of this class, letter and numerical grades will typically be distributed according to the university grading scale between the following standards:
A (4.0)= Excellent and exceptional work (typically >90% of available points)
D (1.0) = Deficient work (typically <66% of available points)
It is expected that most students will perform at a level of ~3.5.

Points will be available according to the following percentage breakdown:

Homework (20%): Students will have the opportunity to complete 4 homework assignments, each worth 5 % of the overall grade. Homework assignments will be designed around each of the major steps in a QMRA (hazard identification, exposure assessment, health effects assessment, and risk characterization) and are meant to guide the student towards successful completion of the oral presentation and final written risk assessment.

Exam (20%): One exam will be given during the quarter. It will consist primarily of short answer questions, but may include multiple choice, and fill-in the blank questions as well. Exam will be delivered through WebQ (link will be provided May16th at the end of class). Exam will be open book and open note.

Class Participation (15%): Students may earn participation credit by contributing to classroom discussion and participation in modeling exercises. Additionally, participation-credit questions may be asked in class for email response. Students will also be expected to participate equitably in their risk assessment groups. Peer evaluation will determine group participation.

Oral Presentation of Risk Assessment (20%): Students will give in-class presentations of risk assessments on their chosen topics during the last two weeks of class.

Final Risk Assessment (25%): Final written risk assessments will be due by the scheduled final exam time. Final written risk assessments may be submitted by email. Final written risk assessment shall be the culmination of homeworks and orally presented risk assessment.

ACADEMIC ACCOMODATIONS: Disability Resources for Students (DRS) offers resources and coordinates reasonable accommodations for students with disabilities. Reasonable accommodations are established through an interactive process between you, your instructor(s) and DRS. If you have not yet established services through DRS, but have a temporary or permanent disability that requires accommodations (this can include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact DRS at 206-543-8924 or uwdrs@uw.edu or disability.uw.edu

COURSE CONTENT OUTLINE:

Date	Topic	Location	Instructor	Due
31-Mar	Introduction/Why is Microbial Risk Assessment Different than Chemical Risk Assessment	Computer Lab A	Meschke	
2-Apr	Overview of Microbial Risk Assessment Frameworks	Computer Lab A	Meschke	
4-Apr	Identification of Microbial Risks/Exposure Routes	Computer Lab A	Meschke	
7-Apr	Problem Formulation/Determination of Health Endpoint	Computer Lab A	Meschke	
9-Apr	Exposure Assessment	Computer Lab A	Meschke	Problem Formulation
11-Apr	Introduction to Excel and Crystal Ball	Computer Lab A	Meschke	
14-Apr	Introduction to R	Computer Lab A	VanAbel	
16-Apr	Deterministic Methods of Exposure Assessment	Computer Lab A	Kissel	
18-Apr	Probabilistic Methods of Exposure Assessment I	Computer Lab A	Kissel	
21-Apr	Probabilistic Methods of Exposure Assessment II	Computer Lab A	Kissel	
23-Apr	Group Work	Computer Lab A	Meschke/Kissel	
25-Apr	Dose Response Assessment	Computer Lab A	Meschke	Exposure Assessment
28-Apr	Dose Response Modeling (Excel)	Computer Lab A	Kissel	
30-Apr	Dose Response Modeling (CAMRA code in R)	Computer Lab A	Meschke	
2-May	Transmission Models	Computer Lab A	Meschke	
5-May	Group Work	Computer Lab A	Meschke/Kissel	Dose Response Assesment
7-May	Risk Characterization	Computer Lab A	Kissel	
9-May	Sensitivity and Uncertainty Analyses	Computer Lab A	Kissel	
12-May	Group Work	Computer Lab A	Meschke/Kissel	
14-May	Risk Metrics: DALYs, QALYs, etc.	Computer Lab A	Meschke	
16-May	Perception of Risk/Risk Communication/Risk Management	Computer Lab A	Meschke	
19-May	Geospatial risk model for vectorborne disease	Computer Lab A	VanderKelen	Risk Characterization
21-May	Application of QMRA at EPA	Computer Lab A	Schoen	
23-May	Baesian approaches to QMRA	Computer Lab A	Schoen	**Exam**
26-May	Holiday-Memorial Day	**NO CLASS**		
28-May	Group Presentations	Computer Lab A		
30-May	TBD	Computer Lab A	VanAbel	
2-Jun	Group Presentations	Computer Lab A		
4-Jun	Group Presentations	Computer Lab A	Meschke/Kissel	
11-Jun	**Final Risk Assessments and Group Evaluations Due by 4:20**			Final Risk Assessment

READINGS

Students may be assigned readings for particular class sessions. These readings will typically be 20-25 pages in length (though combined readings may be assigned for multiple sessions exceeding this length). Readings will commonly be chapters from the recommended text or other reference texts, but may include website or journal articles.

COURSE RULES

1. Come to class, please try to let me know ahead of time if you can not make it.
2. Arrive on time
3. Turn in assignments on time
4. Come to class prepared (keep up with reading)
5. Be courteous (No newspapers, audible cell phones, PDAs, beepers)
6. Food and drinks are welcome (but keep it quiet)
    a. Exception-No food or drink in laboratory
7. Refrain from unnecessary talking
8. ASK QUESTIONS
9. Try to remain awake (at least no snoring please)
10. Let me know how we are doing (if I am moving too fast, not being clear, or otherwise not getting the message across, I need to know.)